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culatis. (Genus *Gynotrochi*, *Cassipoureæ*, *Caralliæ*, et *Crossostyli* Forst. (certissime inter Legnotideas collocandæ !) affine, sed tetramerum, polyandrum, petalis integerrimis.)

HAPLOPETALON RICHII. — Feejee Islands.

SICYOS, Linn., subgen. SICYOCARYA.

Fructus ovato-pyramidatus vel oblongus, 4 – 6-angulatus (rarissime triqueter), inermis, pl. m. rostratus; pericarpio incrassato. Antheræ 2 – 5, sinuosæ, basi connatæ ; connectivo angusto.

1. SICYOS PACHYCARPUS, *Hook. & Arn.* — Sandwich Islands.

2. SICYOS MACROPHYLLUS (sp. nov.) : foliis magnis cordato-rotundis 3 – 5-lobatis argute denticulatis subtus puberulis ; paniculis masculis umbellato-compositis longe pedunculatis ; pedicellis filiformibus ; fructu ovato 5 – 6-angulato glabrato rostrato. — Hawaii, Sandwich Islands.

3. SICYOS CUCUMERINUS (sp. nov.) : glaber ; foliis late cordatis integris denticulatis; paniculis masculis breviter pedunculatis sæpe trifidis racemosis ; fructu oblongo 5 – 6-angulato glaberrimo. — Var. β. foliis triangulato-cordatis promisse acuminatis. — Var. γ. foliis pedatilobis. — Hawaii, Sandwich Islands.

SICYOS, subgen. SICYOPSIS.

Fructus obovatus, turgidus, inermis, hirsutus, infra apicem obtusissimum dentibus calycinis subulatis deflexis coronatus ; pericarpio baccato. Columna staminum apice trifida. Antheræ 3 liberæ, vel 5 triadelphæ ; connectivo dilatato plano utrinque emarginato.

SICYOS MONTANUS, Pœpp. & Endl. — Peru.

Three hundred and eighty-fourth meeting.

October 11, 1853. — ADJOURNED QUARTERLY MEETING.

The PRESIDENT in the chair.

The report of a committee on social meetings of the Academy was taken from the table, and, after some remarks of Messrs. Emerson, Gould, Gray, and the President, adopted. A committee, consisting of Messrs. C. Jackson, Jr., Dr. Cabot, and Dr. H. I. Bowditch, was appointed to make the necessary arrangements.

Dr. W. I. Burnett read a memoir entitled "Researches on the Development of the Aphides," of which the following is an abstract: —

"My observations were made upon *Aphis caryæ* (probably *Lachnus* of Illiger, or *Cinara* of Curtis), one of the largest and most favorable species for these investigations. This was the spring of 1853. The first colony, on their appearance from their winter quarters, were of mature size, and contained, in their interior, the developing forms of the second colony quite far advanced in formation. On this account it was the embryology of the third series or colony that I was able to first trace. A few days after the appearance of the first colony (A), the second colony (B), still within the former, had reached two thirds of their full embryonic size; the arches of the segments had begun to close on the dorsal surface, and the various appendages of the embryo were becoming prominent; the alimentary canal was more or less completely formed, although distinct abdominal organs of any kind belonging to the digestive system were not apparent.

"At this time, and while the individuals B were not only in the abdomen of their parents A, but were also inclosed each in its primitive egg-like capsule, — at this time, I repeat, appeared the first traces of the germs of the third colony, C. Their first traces consisted of small egg-like bodies, arranged two, three, or four in a row, and attached at the locality where are situated the ovaries in the oviparous forms of the Aphididæ. These egg-like bodies were either single nucleated cells of one three-thousandth of an inch in diameter, or a small number of such cells inclosed in a simple sac. These are the germs of the third generation or colony, and they increase *pari passu* with the development of the embryo in which they are formed, and this increase of size takes place, not by the segmentation of the primitive cells, but by the endogenous formation of new cells within the sac. After this increase has continued for a certain time, these bodies appear like little oval bags of cells, — all the component cells being of the same size and shape, — there being no one particular cell which is larger and more prominent than the others, and which could be comparable to a germinative vesicle. While these germs are thus constituted, the formation of new ones is continually taking place. This occurs by a kind of constriction process of the first germs; one of the ends of these last being pinched off, as it were, and so what was before a single body or sac becoming two, which are attached in a moniliform manner. The new germs thus formed may consist each of a single cell only, as I have often seen; but they soon attain a more uniform size by the endogenous formation of new cells within the sac in which it is inclosed. In this way the germs are multiplied to a considerable number, the nutritive material for their growth being apparently a fatty liquid, in which they are bathed, contained in the abdomen, and which is thence derived from the abdomen of the first parent. When these germs have reached the size of about one three-hundredth of an inch in diameter, there appears on each, near the inner pole, a yellowish, vitellus-looking mass or spot, composed of yellowish cells, which, in size and general aspect, are different from those constituting the germ proper. This yellow mass increases after this period, *pari passu* with the germ, and at last lies like a cloud over and partially concealing one of its poles. I would, moreover, insist upon the point, that it does not gradually extend itself over the whole germ-mass, and is, therefore, quite unlike a proligerous disc.

" When these egg-like germs have attained the size of a one-hundred-and-fiftieth of an inch in diameter, there begins to appear distinctly the sketching or marking out of the future embryo. This sketching consists at first of delicately marked retreatings of the cells here and there ; but these last soon become more prominent from sulcations, and at last the form of an articulated embryo is quite prominent.

" During this time, the yellowish, vitellus-looking mass has not changed its place, and, although it is somewhat increased in size, yet it appears otherwise the same. When the development has proceeded a little further, and the embryo has assumed a pretty definite form, the arches of the segments, which have hitherto remained gapingly open, appear to close together on the dorsal surface, thereby inclosing the vitellus-looking mass within the abdominal cavity. It is this same vitelloid mass thus inclosed, which furnishes the development of the new germs (which in this case would be those of the fourth colony, or D), and this germ development here commences with the closing up of the abdominal cavity, and then the same processes we have just described are repeated.

" The details of the development subsequent to this time, the formation of the different systems of organs, &c., are precisely like those of the development of true oviparous Arthropoda in general; and although the ovoid germ has at no time the structural peculiarities of a true ovum, — such as a real vitellus, germinative vesicle, and dot, — yet if we allow a little latitude in our comparison, and regard the vitellus-looking mass as the *mucous*, and the germ-mass proper as the *serous* fold of the germinating tissue, as in true ova; — if this comparison of parts can be admitted, then the analogy of the secondary phases of development between these forms and true ova of the Arthropoda can be traced to a considerable extent.

" These secondary phases of development need not here be detailed, for they correspond to those described by Herold and Kölliker, of the true ovum in other Insecta, and which, too, I have often traced in various species of the Arthropoda in general.

" When the embryo is fully formed and ready to burst from its capsule in which it has been developed, it is about one sixteenth of an inch in length, or more than eight times the size of the germ, when the first traces of development in it were seen. From this last-mentioned fact, it is evident that, even admitting that these germ-masses are true eggs, the conditions of development are quite different from those of the eggs of the truly viviparous animals, for in these last the egg is merely hatched in the body instead of out of it, and, moreover, it is formed exactly as though it was to be deposited, and its vitellus contains all the nutritive material required for the development of the embryo until hatched. With the Aphididæ, on the other hand, the developing germ derives its nutritive material from the fatty liquid in which it is bathed, and which fills the abdomen of the parent. The conditions of development in this respect are here, therefore, more like those of the Mammalia, and the whole parent animal may be regarded in one sense as an individualized uterus filled with germs; for the digestive canal with its appendages seems to serve only as a kind of laboratory for the conversion of the succulent liquids this animal extracts from the tree on which it lives, into this fatty liquid which is the nutritive material of the germs.

" Omitting the curious and interesting details of the further history of the economy of these Insecta, as irrelevant to the point in discussion, we will now turn to see what view we should take of these processes, and what is their physiological interpretation. In the first place, it is evident that the germs which develop these viviparous Aphides are not true eggs; they have none of the structural characteristics of these last, — such as a vitellus, a germinative vesicle, and dot; on the other hand, they are at first simple collections, in oval masses, of nucleated cells. Then, again, they receive no special fecundating power from the male, which is the necessary preliminary condition of all true eggs; and furthermore, the appearance of the new individual is not preceded by the phenomena of segmentation, as is also the case with all true eggs. Therefore, their primitive formation, their development, and the preparatory changes they undergo for the evolution of the new individual, are all different from those of real ova.

" Another point of equal importance is, these viviparous individuals of the Aphides have no proper ovaries and oviducts. Distinct organs of this kind I have never been able to make out. The germs, as we have before seen, are situated in moniliform rows, like the successive joints of confervoid plants, and are not inclosed in a special tube. These rows of germs commence each from a single germ-mass, which sprouts from the inner surface of the animal, and increases in length and the number of its component parts by the successive formation of new germs by the constriction process as already described. Moreover, these rows of germs, which, at one period, closely resemble in general form the ovaries of some true Insecta, are not continuous with any uterine or other female organ, and therefore do not at all communicate with the external world; on the other hand, they are simply attached to the inner surface of the animal, and their component germs are detached into the abdominal cavity as fast as they are developed, and thence escape outwards through a *porus genitalis.*

" With these data, the question arises, What is the proper interpretation to be put upon these reproductive phenomena we have just described? My answer would be, that the whole constitutes only a rather anomalous form of gemmiparity: as already shown, the viviparous Aphididæ are sexless; they are not females, for they have no female organs, they are simply *gemmiparous*, and the budding is internal, instead of external, as with the Polypi and Acalephæ; moreover, this budding takes on some of the morphological peculiarities of oviparity, but these peculiarities are economical and extrinsic, and do not touch the intrinsic nature of the processes therein concerned. Viewed in this way, the different broods or colonies of Aphididæ cannot be said to constitute as many true generations, any more than the different branches of a tree can be said to constitute as many trees; on the other hand, the whole suit, from the first to the last, constitute but a single true generation. I would insist upon this point as illustrative of the distinction to be drawn between *sexual* and *gemmiparous* reproduction. Morphologically, these two forms of reproduction have, it is true, many points of close resemblance, but there is a grand physiological difference, the perception of which is deeply connected with our highest appreciation of individual animal life.

"A true generation must be regarded as resulting only from the conjugation of two opposite sexes, — from a sexual process in which the potential representatives (spermatic particle and ovum) of two opposite sexes are united for the elimination of one germ. The germ power thus formed may be extended by gemmation or fission; but it can be formed only by the act of generation, and its play of extension by budding or by division must always be within a certain cycle, which cycle is recommenced by the new act of the conjugation again of the two sexes. In this way the dignity of the ovum as the primordium of all true individuality is maintained.

"In the memoir from which this is an extract, I have entered into a full discussion of those many points suggested by these studies. One of these is the relation of this subject to some of the various doctrines of development, which have been advanced in late years, such as that of *Alternation of Generation* by Steenstrup, and that of *Parthenogenesis* by Owen. I have there attempted to show that the phenomena of these doctrines, as advanced by their respective advocates, all belong to those of gemmiparity, and that therefore Alternation of Generation and Parthenogenesis, in their implied sense, are misnomers in physiology. Another point there treated *in extenso* is the identity of this mode of reproduction we have just described in the Aphididæ with that observed in the so-called hibernating eggs of the Entomostraca, and the like phenomena observed in nearly every class of the Invertebrata. They are all referable, in my opinion, to the conditions of gemmation, modified in each particular case, perhaps by the economical relations of the animal."

Dr. Samuel Parkman and Dr. Benjamin E. Cotting were elected Fellows of the Academy in the Section of Medicine and Surgery.